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ABSTRACT

This study investigated whether the "Big-5" structure (a 5-factor model used to capture variance in adult personality) can be obtained from parental ratings of 4-year-old children using traditional markers of this structure that are derived primarily from research on adult personality. The study also examined whether Big-5 markers can be used to meaningfully predict children's behavior problems. Participants were 359 preschool children from 10 public preschools in Bermuda and their parents. Parents completed the Early Childhood Behavior Inventory (ECBI), a measure of the extent to which their children manifested behavior problems. The ECBI used a structure composed of five factors: Conduct and Noncompliance; Tense and Withdrawn; Attention and Neurological; Fearful and Sensitive; and Eating and Elimination. After completing the ECBI, parents responded to 10 Big-5 bipolar marker scales. Analysis indicated that Big-5 marker scales performed predictably according to Big-5 theory. Big-5 language was useful in predicting behavior problems in preschool children, particularly for Conduct, Withdrawal, and Attention and Neurological problems. This research supports the idea that measures of normal personality variation designed to assess most of the Big-5 would be helpful in elucidating developmental psychopathology. Eleven tables of data are included. (MM)

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ARE BEHAVIOR PROBLEMS IN PRESCHOOL CHILDREN RELATED TO BIG-FIVE MARKERS

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A major focus of developmental research in childhood is on the prediction psychopathology, or behavior problems. While a wide variety of variables have been used as predictors in such research, normal personality differences have rarely been assessed for this purpose. The exception to this generalization is the research by temperament researchers in which normal variation in those emotional characteristics that are thought of as temperamental have been studied as predictors of pathology, and have often been found to be predictive of problematic behavior over considerable periods of time (e.g., Thomas & Chess, 1977; Garrison & Earls, 1987).

With the emergence of a consensus that a five-factor model captures much of the variance in adult personality (see Digman, 1990 and John, Angleitner, & Ostendorf, 1990, for reviews), the question arises as to the extent to which the Big-5 model can be used as an alternate conceptualization of normal personality in childhood. Digman and colleagues (Digman, 1989; Digman & Inouye, 1986; Digman & Takemoto-Chock, 1981) have found that teacher's ratings of children in preschool and elementary school conform closely to the Big-5 structure. There must be a lower age limit, however, in which Big-5 markers can no longer be used to determine personality structure, and are no longer useful as predictors of other variables of importance. For example, neonates can hardly be said to manifest behaviors strongly related to the construct of "Conscientiousness", or "Openness to Experience", at least as these traits are conceptualized and measured in later childhood and adulthood.

There has been only one attempt known to this author to determine the extent to which Big-5 personality scales predict behavior problems in childhood. Victor (in press) found for fifth- and sixth-grade children that scores on a parent-rating measure of Big-5 personality designed for children predicted nearly forty percent of the variance in conduct problem as rated by teachers.

The purposes of the present study were two fold. First, to determine if Big-5 structure can be obtained from parental ratings of 4-year-old children using traditional markers of this structure derived primarily from adult research. Second, can Big-5 markers be used to meaningfully predict behavior problems as rated by parents.

Method

Participants consisted of 359 preschool children from ten public preschools on the island of Bermuda. The mean age of the sample was 56.4 months (s.d. = 4.1 months). One hundred fifty four were male, and 200 were female. Sixty-nine percent were Black (of African ancestry) and 21 percent were White (of European ancestry) with the remainder having both Black and White parents. With the exception of a slight over samplying of Black

families, and a considerable over samplying of females, the sample and their parents matched well the characteristics of the populations of preschoolers on the island. (See Tables 1 and 2 for an extended description of the sample, their parents, and comparisons to the population of the Island).

During the Spring of 1992, parents were contacted through preschool teachers and asked to complete a measure of the extent to which their children manifest behavior problems. The measure (referred to as the Early Childhood Behavior Inventory) consisted of 63 items sampling those behavior problems thought to be most prevalent and predictive of later problems among preschool children. (See Table 3 for an indication of item representation on the measure.) The Early Childhood Behavior Inventory (ECBI) is in the early stages of development, thus little is known about the reliability and validity of the measure. However, repeated exploratory factor analyses on this sample determined that a five factor solution was the most appropriate structure for this measure. The factors were labeled Conduct/Noncompliance, Tense/Withdrawn, Attention/Neurological, Fearful/Sensitive, and Eating/Elimination.

After completing the ECBI, the parents responded to ten Big-5 bipolar marker scales. These scales were based on descriptions of the main factors and facets of these factors by Costa and McCrae (1992) as well as on the listing of Big-5 markers by Goldberg and Rosolack (in press). The wording was changed in some cases to facilitate application to preschool children. (See Table 4 for a listing of marker scales.)

Results and Discussion

The first issue addressed was whether the ten markers scales that were designed to assess aspects of the Big-5, actually resulted in a five factor structure on this sample. The data were submitted to a principal factoring analysis with varimax rotation. Table 5 presents the results. Four substantial factors were found; the fifth factor had only trivial loadings. The first factor was made up of the markers for Agreeableness (Irritable/Selfish and Difficult to Manage) as well as the Activity Level marker from Extraversion. It seems clearly to represent the Agreeableness factor with the items stated in the negative direction. The second factor was anchored by the one marker from the Conscientious, plus the marker for "Openness to Experience", but seems clearly to be related to Conscientiousness. The third factor is made up of all three markers from the Neuroticism factor, and the fourth factor is composed exclusively of Extraversion markers.

In summary, with a few exceptions, these ten marker scales performed in a manner that would be predicted by Big-5 theory. The exceptions were that there was no clear "Openness to Experience" factor, two of the items from the Neuroticism factor loaded on several other factors, and Activity Level was placed in

the Agreeableness (negative direction) factor not in the Extraversion factor. It is recognized that attempting to get a clean five factor structure from ten items (bipolar scales) is asking a great deal of the five factor model. Further, only one item was presented for the Conscientiousness factor, and one for the Openness to Experience factor. Finally, the words used were adjusted for the preschool age range, and therefore may have not been a clean reflection of the Big-5 factor they were intended to represent. Under these constraints, the resulting factor structure was amazingly supportive of four of the five factors of the Big-5. These data support the fact that parents find Big-5 concepts useful in describing the behavior of their preschool children. Further, it should be remembered that the parents doing the ratings were predominantly African Americans from a Caribbean cultural. This further, supports the cross-cultural generalizability of the Big-5 model.

The second question to be addressed was the extent to which Big-5 marker scales covaried with factor analytically derived behavior problem scales. One way to address this issue was to factor analyze the items of the ECBI and the Big-5 marker scales in one analysis to determine the loading of Big-5 markers on the behavior problem factors. These data are presented in Table 6. The first factor labeled Noncompliance/Conduct Problems was anchored by the Irritability/Selfish (negative Agreeableness) scale, and the Active/Energetic scale also loaded heavily on this factor. The second factor, labeled Tension/Withdrawal Problems, was anchored (negative loading) by Talkative/Outgoing (Extraversion) scale with the other Extraversion scale (Bossy/Wants to be First) having a heavy loading on this factor also. The third factor labeled Attention/Neurological Problems was found to include the Persistent/Tries Hard scale and the Curious/Interested in the World scale (both with negative loadings). A fourth factor was made up of behavior problem items that dealt with specific fears. Only the Easily Upset/Emotional Scale loaded on this factor and the loading was not strong. The final factor was composed of items dealing with eating and elimination problems, and no Big-5 scale loaded on this factor.

This analysis revealed that Negative pole of Agreeableness and Activity Level (from the Extraversion) captures a good deal of the variance of conduct problem in four-year-olds. Further, problems related to social withdrawal and anxiety are captured to a substantial degree by the negative pole of Extraversion and by Neuroticism markers. The negative pole of Conscientious is somewhat related to attention and neurological problems in preschool children, but specific fearfulness and eating/elimination problems in this age group were weakly related to the Big-5 markers used. This result lends support to the notion that Big-5 language is useful for describing many problems affecting preschool children
but some problems are outside the domain of these descriptors.

An additional way to determine if Big-5 marker scales covary

with behavior problem factor scales is to determine the bivariate and multivariate relations between them. Table 7 presents the bivariate correlations and tables 8 through 10 present the results of stepwise multiple regressions, in which ECBI factor scores were predicted from Big-5 marker scales. Most of the bivariate relations were in the .20 to .30 range, and all marker scales correlated with some factor scale in this range. With regard to the multiple regression analyses, it was determined that Big-5 marker scales predicted the most variance of the Noncompliance/Conduct Factor (33%), but predicted about 20% of the variance in the Tension/Withdrawal and the Attention/Neurological factors. The Fears/Sensitivity factor was weakly related to Big-5 markers, and there was no significant prediction of Eating/Elimination problems.

In summary, Big-5 language is useful in predicting behavior problems in preschool children, particularly for Conduct, Withdrawal, and Attention/Neurological problems. However, it seems clear that behavior problems in this age group cannot be reduced to Big-5 descriptors. This research supports the notion that measures of normal personality variation designed to assess at least the first four of the Big-5 would be helpful in elucidating developmental psychopathology.

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Table 1

Sample Characteristics and Comparisons to Population Statistics

Characteristic	Sample		Population
	Number	Percent	Percent
Size	359	44.3[1]	1.4[2]
Gender			
Male	154	42.9	50.0[3]
Female	200	55.7	50.0
Missing Data	5	1.4	
Ethnicity/Race			
Black	248	69.1	38.0[4]
White	75	20.9	39.0
Other	24	6.9	6.0
Missing Data	12	3.3	
Age			
Months			
46	1	0.3	
49	1	0.3	
50	2	0.6	
51	3	0.9	
52	53	16.3	
53	37	11.4	
54	20	6.2	
55	22	6.8	
56	32	9.8	
57	23	7.1	
58	20	6.2	
59	38	11.7	
61	31	9.5	
62	23	7.1	
63	12	3.7	
Total	317		
Missing data	42		
Mean	56.42		
S.D.	4.12		

1 The percentage of 4 year olds in the population that were sampled.

2 810 is 1.4 percent of the total population of the island.

3 Percentage of 4 year olds in the population of each gender is unknown. A 50-50 split was estimated.

4 The percentage reflects the racial split in the population, not the racial split of preschoolers, or 4 year olds.

Table 2

Characteristics of Parents and Comparisons to Population

Characteristic	Sample		Population
	Number	Percent	Percent
Respondent			
Father	117	33.1	not a useful comparison
Mother	228	64.4	
Grandparent	5	1.4	
Foster Parent	2	0.6	
Other	2	0.6	
Missing Data	5	1.4	
Age of Parent			
Under 20	12	3.3	no data available
21 - 30	144	40.1	
31 - 40	167	46.5	
41 and over	27	7.5	
Missing Data	9	2.5	
Marital Status			
Married	243	67.7	66
Single	108	30.1	34
Missing Data	8	2.2	
Education of Parent			
Primary School Graduate	32	8.9	37.0
Secondary School "	128	35.7	31.0
BDA College "	76	21.2	18.0
College/University "	34	9.4	13.0
Missing Data	13	3.6	

Table 3

Types of Items Present on the ECBI

Problem Type	Items Numbers
Externalizing Problems	
Aggression (to people or animals)	29, 30, 31, 55, 60, 61
Destructiveness (of property)	35, 36
None compliant with adult demands or instructions	1, 6, 21, 43
Poor Peer/Sibling Relations	23, 29, 30, 60, 61
Expression of negative emotion	19, 33, 44, 56, 57
High activity level	9, 34
Internalizing Problems	
Fears	4, 7, 8, 18, 22, 25
Shy; Withdrawn; Asocial	5, 16, 17
Too dependent on parents	10, 28
Unhappy; sad; worrying	27, 41
Anxious; tense; nervous habits	32, 52
Psychosomatic complaints illness	12, 13, 14

Table 3 con't

Physiologically Related Problem	
Sleep problems	2, 3, 62
Eating problems	11, 26, 54
Bowel and bladder control	47, 48, 49, 50,
Low stimulation threshold	37, 39, 45
Attentional Problems	20, 38, 63
Non-Normative Behavior	
Sexual identification and exhibitionism	24, 51
Other	
Low activity level; passivity	42, 59
Tics	53
Clumsy	58
Stutters	40
Eczema	46

Table 4

Items and Directions for General Personality Questions

In this last section of the questionnaire, please circle the number that best describes your child. Circle a "1" if your child is very much like the words on the left. Circle a "7" if your child is very much like the words on the right. Circle a "2, 3, 5, or 6" if your child is somewhat like the descriptors. Circle a "4" if you child is not strongly one-way or the other.

1.	reserved, withdrawn	1	2	3	4	5	6	7	talkative, outgoing
2.	follower, needs to be more assertive	1	2	3	4	5	6	7	bossy, always wants to be first
3.	active, energetic	1	2	3	4	5	6	7	not very active, real quiet
4.	very nice and kind	1	2	3	4	5	6	7	irritable, selfish
5.	minds well	1	2	3	4	5	6	7	difficult to manage
6.	lazy, doesn't stick with difficult tasks	1	2	3	4	5	6	7	tries hard, persistent
7.	stable, even-tempered	1	2	3	4	5	6	7	easily upset, very emotional
8.	confident	1	2	3	4	5	6	7	lacks confidence
9.	nervous, fearful	1	2	3	4	5	6	7	calm, very few fears
10.	curious, interested in learning	1	2	3	4	5	6	7	not interested in the world, not interested in learning new things

Table 5

Factor Structure of Big-5 Markers

Marker		Factor				
		1	2	3	4	5
P 4.	Irritable /Selfish	.69	--	--	--	--
P 3.	Active/Energetic	.64	--	--	--	--
P 5.	Difficult to Manage	.63	-.30	--	--	--
P 6.	Tries Hard/Persistent	--	.57	--	--	--
P10.	Not Interested In The World or Learning	--	-.47	--	--	--
P 7.	Easily Upset/Emotional	--	--	.52	--	--
P 8.	Lacks Confidence	.38	--	.50	-.35	--
P 9.	Calm/Few Fears	--	.37	-.42	.34	--
P 1.	Talkative/Outgoing	--	--	--	.52	--
P 2.	Bossy/Wants to be First	--	--	--	.52	--

[1] Only loading .30 or above are presented.

[2] Principal Factoring Analysis with Varimax rotation.

Table 6

Loadings of Big-5 Markers on Behavior Problem Factors

Item		Factor[1,2] 1	2	3	4	5
Factor 1--Noncompliance/Conduct Problems						
P4.	Irritable/selfish vs. nice/kind (Agreeableness)	.71	--	.31	--	--
43.	Refuses to obey adult instructions.	.66	--	.36	--	--
30.	Fights with other children who are not brothers and sisters.	.62	--	--	--	--
6.	Stubborn; will not give in to parent suggestions or demands.	.58	--	--	--	--
61.	Quarrels with or teases other children.	.57	--	--	--	--
P3.	Active/energetic vs. quiet/nonactive (Extraversion.)	.47	--	.38	--	--
19.	Has temper tantrums.	.52	--	--	--	--
44.	Whines.	.49	.34	--	--	--
31.	Hits parents.	.47	--	--	--	--
60.	Quarrels with or teases siblings.	.47	--	--	--	--

Table 6 con't

Factor 2--Tense/Withdrawn						
P1.	Talkative/outgoing vs. reserved, withdrawn (Extraversion)	--	-.64	--	--	--
16.	Withdrawn when with unfamiliar children.	--	.63	--	--	--
17.	Not interested in playing with other children.	--	.55	--	--	--
P2.	Bossy/wants to be first vs. follower/non-assertive (Extraversion)	.31	-.52	--	--	--
18.	Anxious or afraid in new situations.	--	.41	--	--	--
5.	Is shy with strangers.	--	.41	.35	--	--
P8.	Lacks Confidence vs. Confident (Neuroticism)	--	.43	.42	--	--
P9.	Calm/Few Fears vs. Nervous/Fearful (Neuroticism)	--	-.40	--	-.35	--

Table 6 con't

Factor 3--Attention/Neurological Problems/Immature

Part 1[4]

63.	Has difficult concentrating.	--	--	.65	--	--
P5.	Difficult to manage vs. Minds well (Agreeableness)	--	--	.59	--	--
20.	Does not continue with an activity without help and encouragement from an adult.	--	--	.58	--	--
38.	Stops an activity (e.g. play with toys) after a few minutes.	--	--	.56	--	--
P6.	Persistent/tries hard vs. lazy/doesn't stick with difficult tasks (Conscientiousness)	--	--	-.50	--	--
P10.	Curious/interested in world vs. not interested in world/ not interest in learning (Openness)	--	--	.43	--	--

Part 2

58.	Clumsy	--	--	.54	--	--
40.	Stutters	--	--	.35	--	--
53.	Has tics; (involuntary twitches, grimaces, or movements)	--	--	.30	--	--

Table 6 con't

Factor 4 -- Fearful/Highly Sensitive

7.	Is afraid of thunderstorms.	--	--	--	.57	--
22.	Afraid of loud noises.	--	--	--	.54	--
8.	Is afraid of the dark.	--	--	--	.52	--
28.	Has difficulty separating from mother and father.	--	--	--	.45	--
45.	Complains that clothes are too tight, itch, or do not feel comfortable.	--	--	--	.44	--
12.	Complains about stomach aches.	--	--	--	.44	--
37.	Complains about loud noises.	--	--	--	.41	--
P7.	Easily upset/emotional vs. stable/even tempered	--	--	--	.34	--
2.	Wakes up during the night.	--	--	--	.31	--

Table 6 con't

Factor 5 -- Eating and Elimination Problems[5]

Part 1 -- Eating						
11.	Eats so much is at risk of overweight.	--	--	--	--	.49
15.	Has poor appetite.	--	--	--	--	-.41
Part II -- Elimination Problems						
49.	Soils him/herself during the night with a bowel movement.	--	--	--	.32	.62
48.	Wets him/herself during the day.	--	--	--	--	.52
50.	Soils him/herself during the day with a bowel movement.	--	--	--	--	.50
47.	Wets clothing or bed during the night.	--	--	--	--	.28

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1 Factors were extracted through principle factoring, with varimax rotation.

2 All loadings above .30 are presented.

3 Items listed are those with the highest loadings on that factor.

4 Parts 1 and 2 of Factors 3 and 5 were based on conceptual/theoretical considerations, not empirical considerations.

Table 7

Correlations Between Big-5 Markers and Behavior Problem Factor Scores

Big-5 Markers	Factor				
	Conduct Noncompl.	Tense With.	Attention Neurolog.	Fearful Sensitive	Eating Elim.
Extraversion					
Talkative/ Outgoing	--[1]	-.33	--	--	--
Bossy	.16	--	--	--	--
Active	.38	.19	.23	--	--
Agreeableness					
Nice/Kind	-.49	--	-.27	--	--
Minds well	-.37	-.20	-.41	.19	--
Conscientiousness					
Persistent	-.22	-.16	-.33	--	--
Neuroticism					
Easily Upset	.27	.24	.18	.19	--
Lacks Confidence	--	.27	.24	.21	--
Openness to Experience					
Interested In World and Learning	--	--	.21	--	--

[1] Only correlations above .15 are presented. All are significant ($p < .01$)

Table 8

Prediction of Noncompliance/Conduct Problems Scores by Big-5 Markers

Predictor	step	R^2	F	Prob.
Irritable/Selfish	1	.27	109.67	.0001
Easily Upset/Emotional	2	.30	11.61	.001
Active/Energetic	3	.32	6.43	.01
Not Interested in World or Learning	4	.33	3.89	.05

[1] Summary results of a step-wise multiple regression.

Table 9

Prediction of Tense/Withdrawn Problem Scores by Big-5 Markers

Predictor	step	R^2	F	Prob.
Lacks Confidence	1	.14	46.25	.0001
Reserved/Withdrawn	2	.19	17.96	.0001
Easily Upset/Emotional	3	.20	6.09	.01

[1] Summary results of a step-wise multiple regression.

Table 10

Prediction of Attention/Neurological Problem Scores by Big-5 Markers

Predictor	step	R^2	F	Prob.
Difficult to Manage	1	.19	67.38	.0001
Nervous/ Fearful	2	.22	12.73	.0001

[1] Summary results of a step-wise multiple regression.

Table 1[1]

Prediction of Fears/Sensitivity Problem Scores by Big-5 Markers

Predictor	step	R^2	F	Prob.
Lacks Confidence	1	.07	20.74	.0001
Easily Upset/Emotional	2	.08	4.32	.05

[1] Summary results of a step-wise multiple regression.